

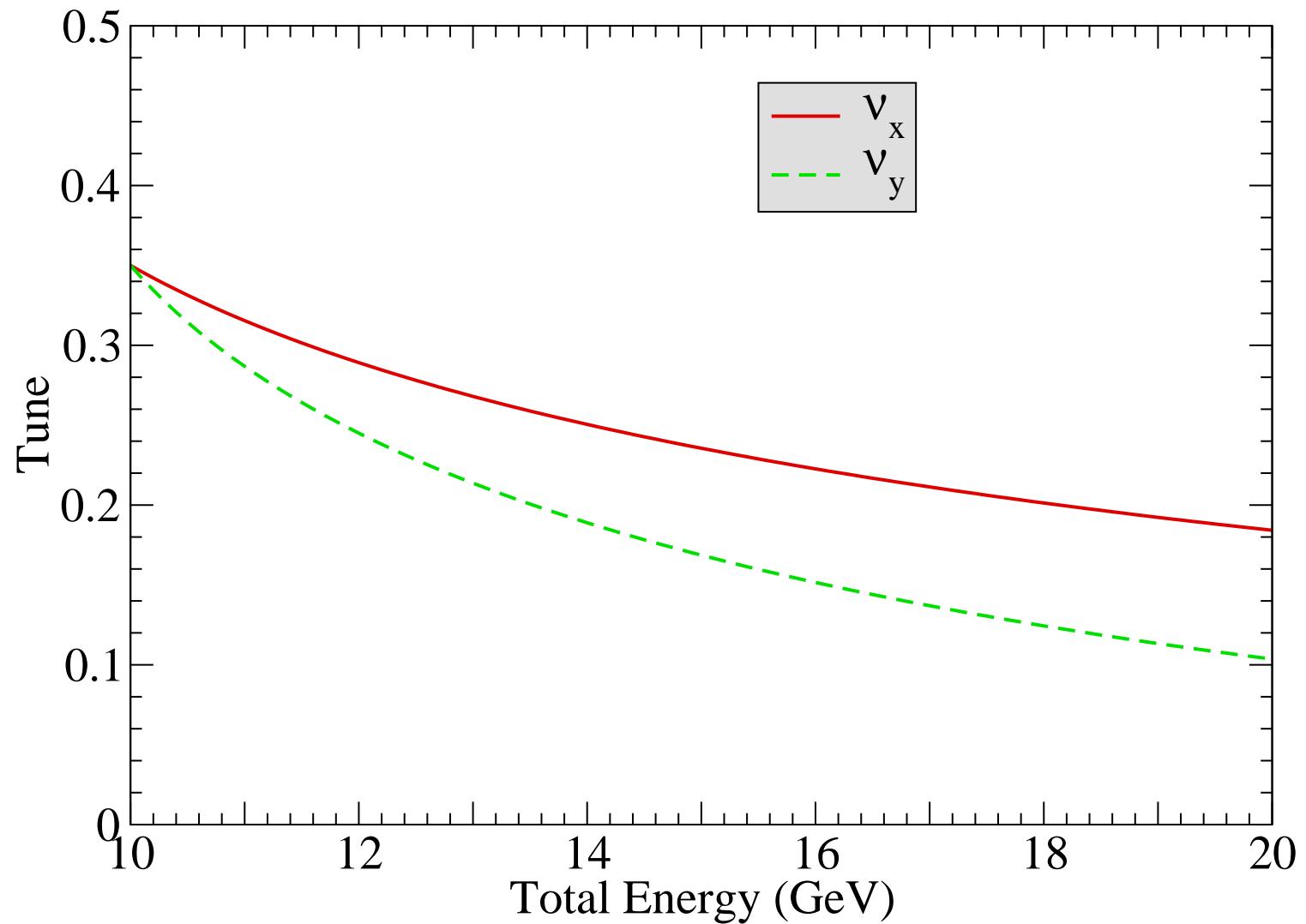
FFAG Lattice Design: Allowing Any Values on the Low-Energy Tunes

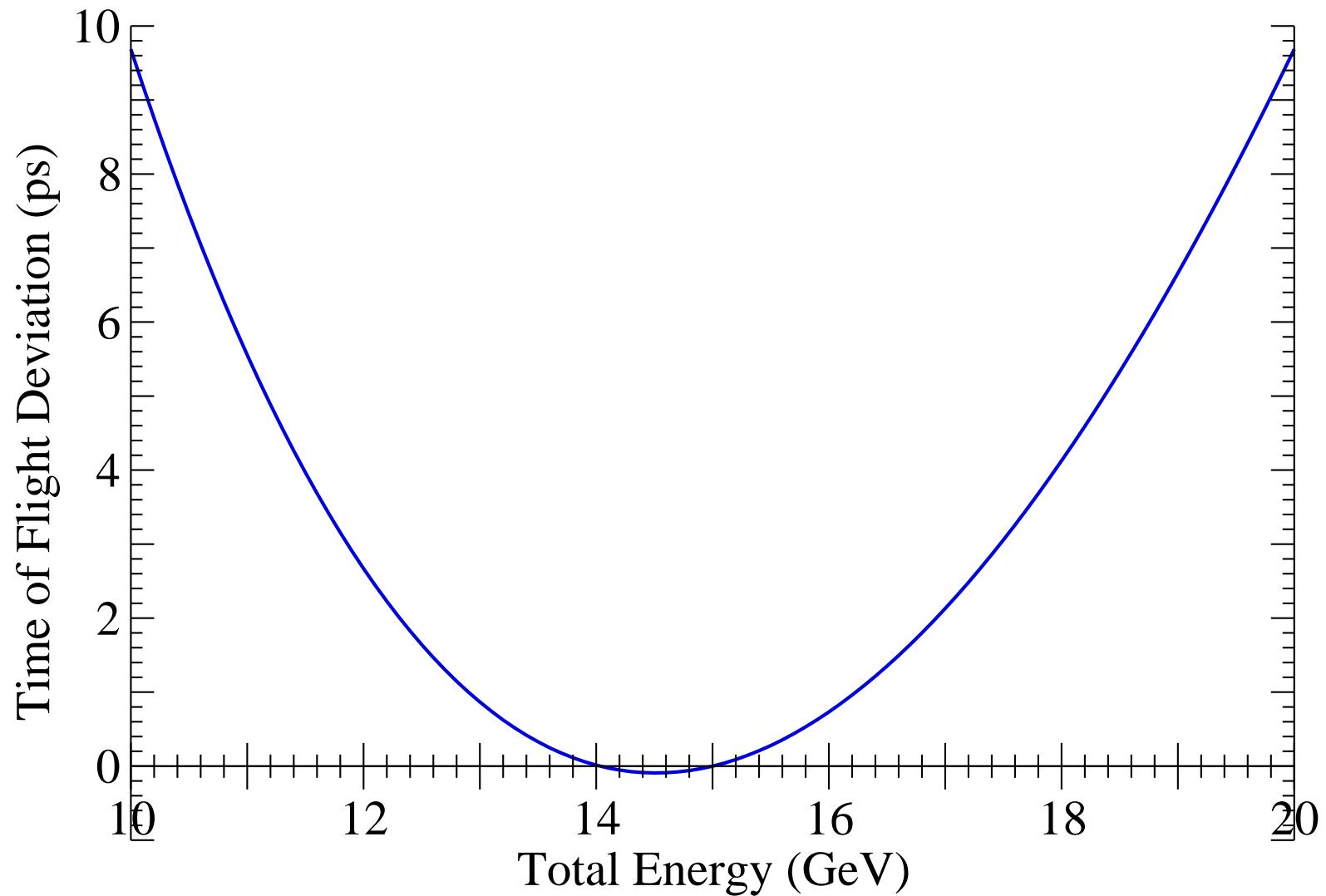
J. Scott Berg

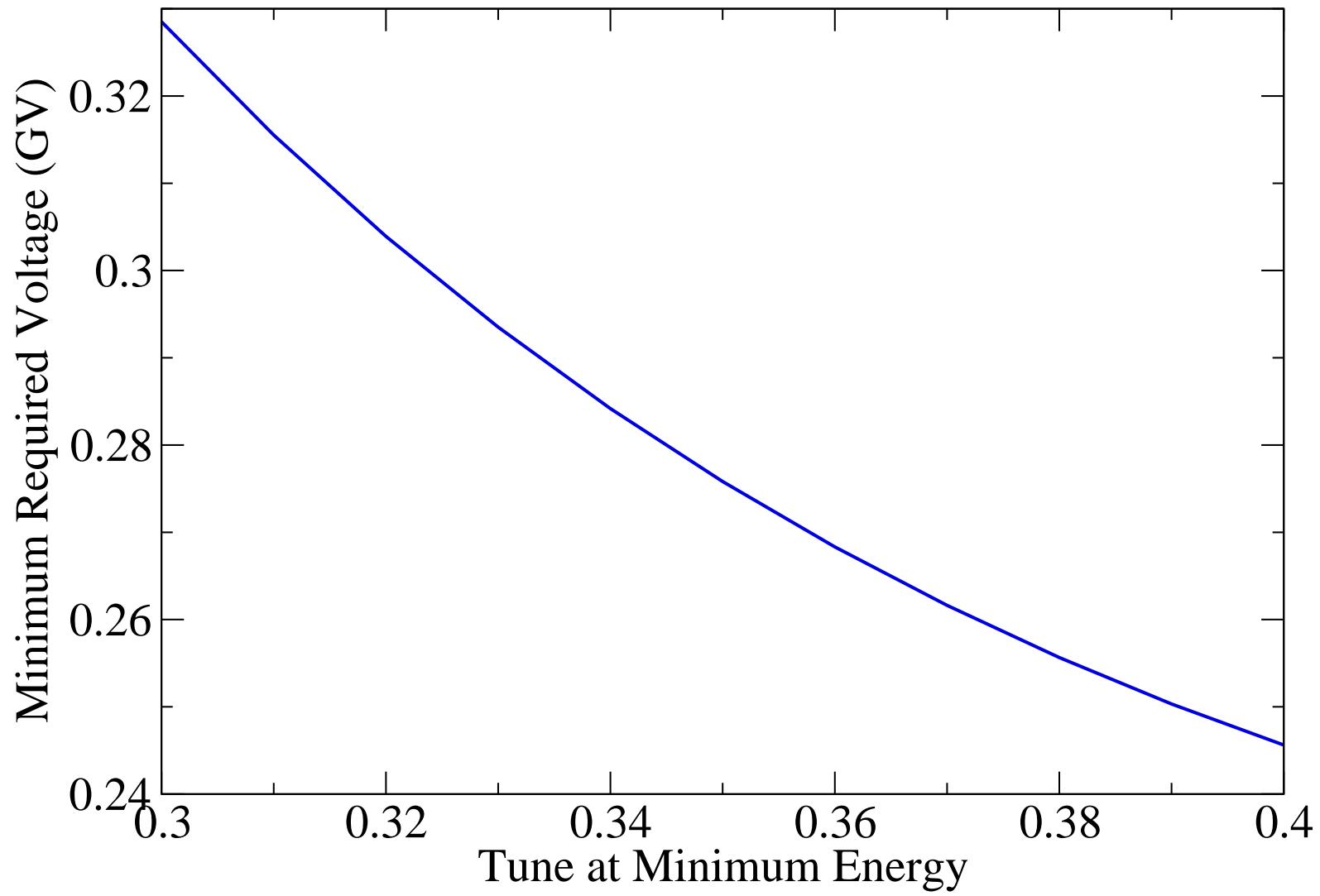
Muon Collaboration Friday Meeting

19 March 2004

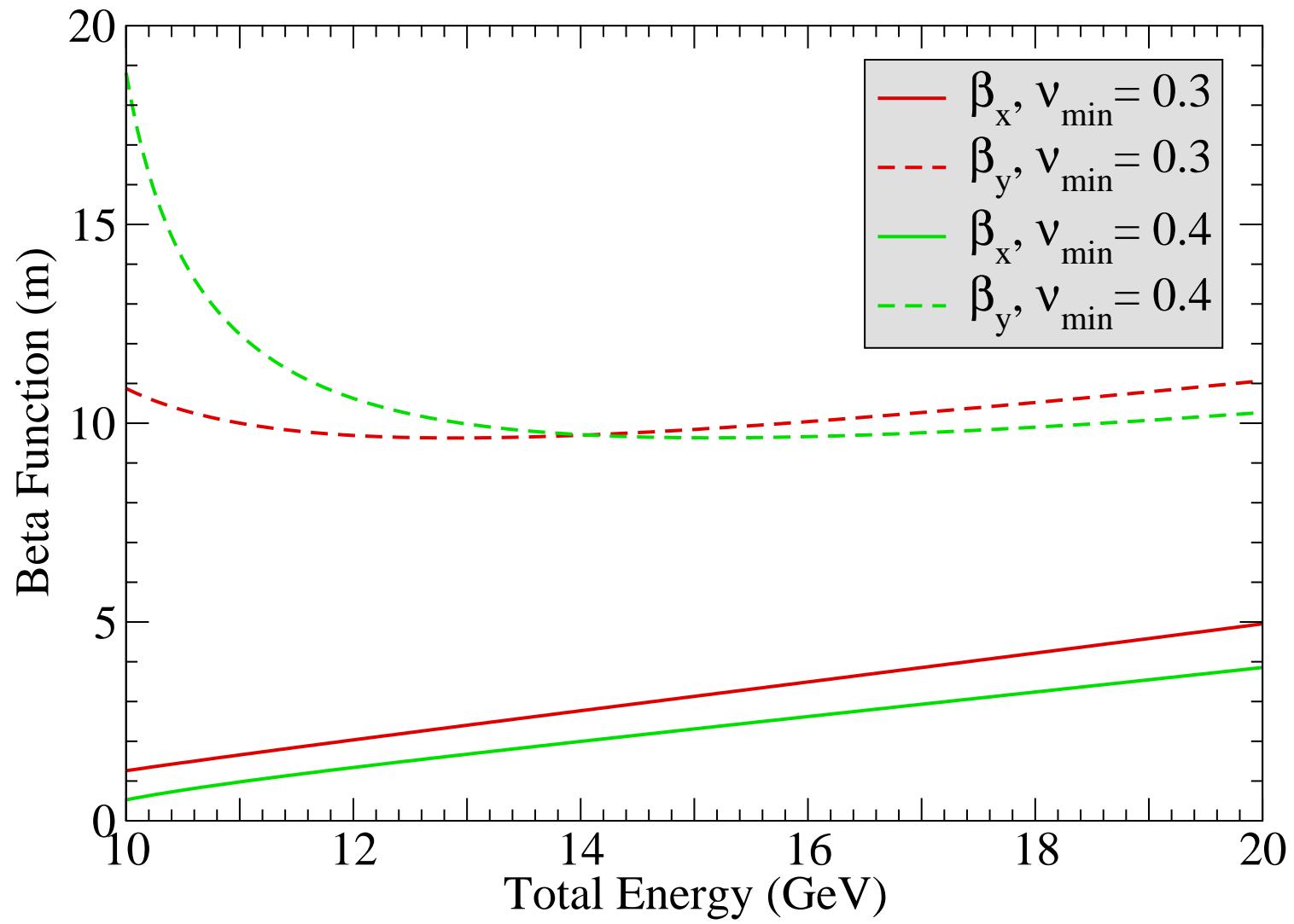
- Cost optimized FFAG designs
- Normally for my optimization, I fix the values of the tunes at the lowest energy
 - ◆ Stay sufficiently away from half integer tune
- Higher tune improves time of flight variation
- Higher tune increases beta functions
 - ◆ Larger aperture requirement
 - ◆ More dynamics problems
- If tunes are the same, 0.35 is approximately optimum cost
- Remove constraint on tunes, see what cost optimization gives





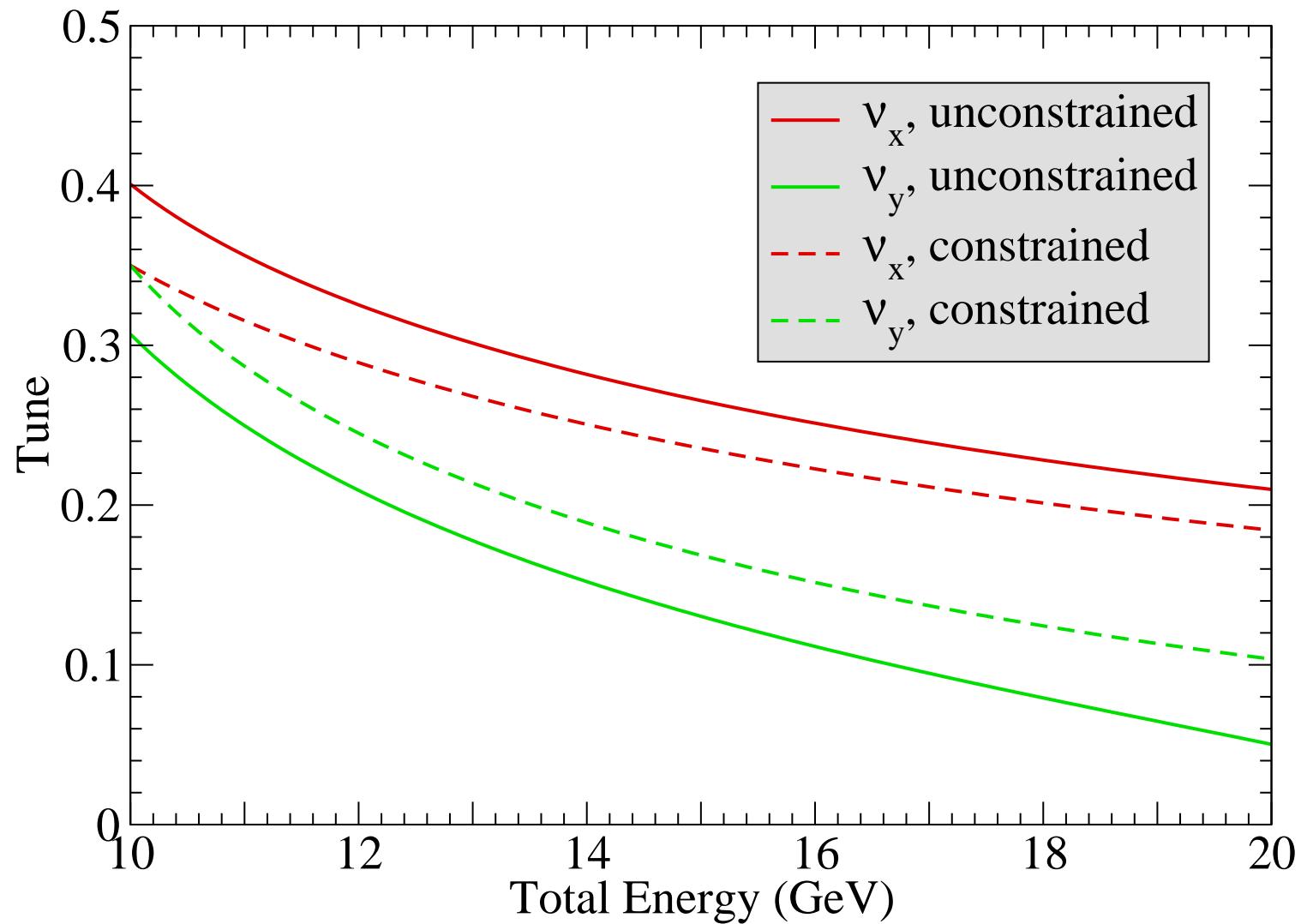


Beta Functions for Different Tunes (FODO)



	Constrained	Unconstrained		
	QD	QF	QD	QF
Cells	105	95		
Voltage (MV)	788	713		
Circumference (m)	768	701		
Cost (PB)	104	93		
Magnet Length (m)	1.762	1.276	1.883	1.246
Magnet Radius (cm)	10.4	12.6	10.3	12.5
Pole Tip Field (T)	4.31	2.18	3.80	2.35

- Allowing tunes to go free improves cost
- Tunes split: horizontal is higher, vertical lower
 - ◆ Higher horizontal improves path length
 - ◆ Lower vertical avoids beta function spike
 - ◆ Beam pipe size determined primarily by orbit swing, not beta functions
 - ★ Orbit swing improved by higher horizontal tune
 - ◆ Lower tune, less integrated magnet strength
 - ★ Use the field strength wisely: to reduce path length



Beta Functions

